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EVALUATION OF TREATMENT SYSTEMS
PONDS A-4, B-5, C-2

IDENTIFICATION OF TREATMENT NEEDS AND TECHNOLOGIES

FOR

EG&G ROCKY FLATS, INC.

BY

IT CORPORATION

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ADMIN RECORD

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EVALUATION OF TREATMENT SYSTEMS
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TREATMENT NEEDS

- * Maintain off-site discharges from Ponds A-4, B-5, and C-2 at \leq standards for the following:

Radionuclides

Plutonium	.05	Picocuries/Liter
Americium	.05	Picocuries/Liter
Tritium	500	Picocuries/Liter
Uranium	10	Picocuries/Liter

Gross Alpha and Beta

Alpha	11	Picocuries/Liter
Beta	19	Picocuries/Liter

- * Develop treatment technologies that are effective and most easily understood and accepted by the local community.
- * Utilize existing carbon adsorption units (if possible) to reduce organic levels to standards. Develop other treatment technologies if necessary.
- * Size system to treat 1,000 to 1,500 gallons/minute for Ponds A-4 and B-5. Size system to treat 600 to 750 gallons per minute for Pond C-2.
- * Minimize waste generation in meeting discharge standards.
- * Minimize impact on environment resulting from installation of treatment system.

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ASSUMPTIONS

- 1) Discharges from Pond C-2 will be diverted from the Woman Creek Drainage to the Walnut Creek Drainage. Therefore, standards applicable to Walnut Creek will be established as standards for discharge from C-2.
- 2) Wastes generated as a result of pond water treatment will be handled as low-level waste.
- 3) Alpha and Beta standards will be met when the radionuclides listed below are reduced to standards.

Plutonium
Americium
Uranium

- 4) Treatment technologies will be developed that have a minimal need for additives.

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TECHNOLOGIES

Flocculation / Coagulation

- * Alum
- * Ferric Sulfate
- * Clay (montmorillonite)
- * Lamella Clarifier

Sludge Dewatering

- * Belt Filter
- * Drum Filter
- * Filter Press

Clarifier Effluent Polishing

- * Cartridge Filters
- * Bag Filters
- * Sand Filters

Dissolved Material Removal

- * Reverse Osmosis
- * Ultrafiltration
- * Carbon Adsorption

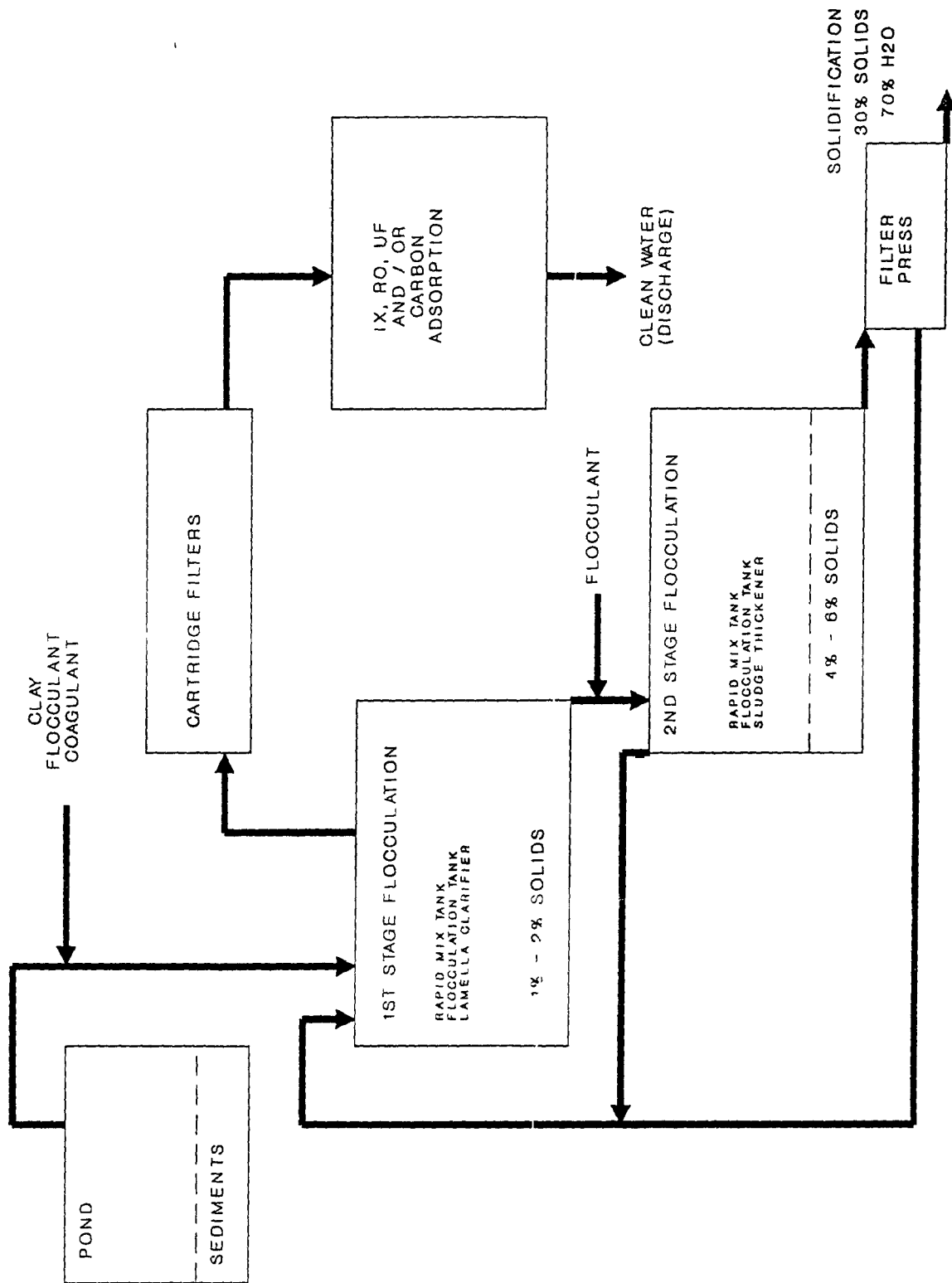
Ion Exchange

- * Ionac A641
- * Dowex 21K

Incineration / Stabilization

- * Incineration / Air Pollution Control
- * Cementation

PROCESS FLOW DIAGRAM - POND TREATMENT



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SUMMARY OF EFFECTIVENESS OF TREATMENT METHODS
FOR URANIUM REMOVAL ⁽¹⁾

<u>TREATMENT METHOD</u>	<u>OBSERVED PERCENT REMOVAL</u>	<u>CONDITIONS</u>
Iron coagulation	80 - 85	pH 6 & 10
Alum coagulation	90 - 95	pH 10
	80 - 85	pH 6
Lime softening	99	pH 10.6
Ion exchange	99	10k-50k BV
Granular activated carbon	90+	Limit.Cap
Reverse osmosis	99	none

Notes:

Under ion exchange, BV refers to bed volumes treated before breakthrough occurs. Typical initial uranium concentrations were 100 picocuries/liter

All of the above technologies were tested against inlet concentrations of uranium ranging from approximately 30 to 150 picocuries/liter.

(1) Sorg, T. J., Methods for Removing Uranium From Drinking Water, EPA/600/J-88/134, Cincinnati, OH, 1988

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DATA NEEDS & SUGGESTED TESTS

- 1) Concentration of non-volatile suspended solids (summer level)
- 2) Pond water pH for Ponds A-4, B-5, and C-2 Are pH values variable with the seasons?
- 3) Reductions (if any) in concentrations of radionuclides attributed to the operation of the existing treatment system (i.e. effectiveness of carbon adsorption and filter bags).
- 4) Identification of sources of the radionuclides of concern.

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DEFINITIONS

- 1) COAGULATION - charge neutralization; addition of coagulant typically reduces the net repulsive (like) charges associated with particles in a liquid.
- 2) FLOCCULATION - term generally includes the process of coagulation; refers to the growth of particles in dilute slurries which assists in subsequent sedimentation and filtration
- 3) LAMELLA CLARIFIER - baffled tank designed to assist in the settling of suspended solids in a liquid.
- 4) SLUDGE DEWATERING - solid/liquid separation process capable of providing a sludge cake consisting of approximately 30% solids and 70% liquid.
- 5) CLARIFIER EFFLUENT POLISHING - process capable of removing particulates (down to approximately 0.45 microns) from a liquid.
- 6) REVERSE OSMOSIS - (RO) use of selective membrane that allows passage of water molecules but prevents passage of ions such as salts. Operating pressures for effective RO range from 200 to 1,200 psig.
- 7) ULTRAFILTRATION - (UF) use of membrane to retain small particles and large molecules. Allows passage of salts, small molecules, and water.